

CLAIMS

Having thus described my invention, what I claim as new and desire to secure by Letters Patent is as follows:

- 1 1. A fiber optic transducer for measuring shear  
2 force or flow rate comprising  
3 a floating head,  
4 a reference surface,  
5 a cantilever means extending between said  
6 reference surface and said floating head, and  
7 a plurality of integral fiber optic sensors  
8 arranged to sense relative motion between said  
9 reference surface and said floating head, each said  
10 integral fiber optic sensor comprising  
11 a tube,  
12 a fiber optic element having an end  
13 within said tube, and  
14 a reflective surface positioned by  
15 said tube at a location spaced from said  
16 end of said fiber optic element by said  
17 tube.
- 1 2. The transducer as recited in claim 1 wherein  
2 said plurality of integral fiber optic sensors are  
3 symmetrically arranged around said cantilever.
- 1 3. The transducer as recited in claim 2 wherein  
2 said plurality of integral fiber optic sensors  
3 comprise two integral fiber optic sensors.

1     4. The transducer as recited in claim 1 wherein  
2     said plurality of integral fiber optic sensors  
3     comprise two integral fiber optic sensors.

1     5. The transducer as recited in claim 1 wherein  
2     some of said plurality of integral fiber optic  
3     sensors are bonded to said cantilever means.

1     6. The transducer as recited in claim 1 wherein  
2     said reflective surface is formed by an end of an  
3     optical fiber.

1     7. The transducer as recited in claim 1 wherein  
2     said end of said optical fiber is substantially  
3     flat.

1     8. The transducer as recited in claim 1, further  
2     including  
3         a housing surrounding said cantilever means and  
4     said plurality of integral sensors.

1     9. The transducer as recited in claim 8, wherein  
2     said housing includes a bellows sealed to said  
3     floating head.

1     10. The transducer as recited in claim 9 wherein  
2     said bellows further includes a spring.

1     11. The transducer as recited in claim 1 wherein  
2     said cantilever means is formed of an alloy.

1 12. The transducer as recited in claim 1 wherein at  
2 least two of said integral sensors are matched for  
3 responses to temperature and pressure.

1 13. The transducer as recited in claim 1 wherein at  
2 least two of said plurality of integral sensors are  
3 substantially insensitive to temperature variation.

1 14. The transducer as recited in claim 1 wherein an  
2 integral sensor of said plurality of integral  
3 sensors includes a plurality of gaps.

1 15. A flow rate or shear force telemetry system  
2 including  
3 a fiber optic transducer for measuring shear  
4 force or flow rate comprising  
5 a floating head,  
6 a reference surface,  
7 a cantilever means extending between said  
8 reference surface and said floating head, and  
9 a plurality of integral fiber optic sensors  
10 arranged to sense relative motion between said  
11 reference surface and said floating head, each said  
12 integral fiber optic sensor comprising  
13 a tube,  
14 a fiber optic element having an end  
15 within said tube, and  
16 a reflective surface positioned by  
17 said tube at a location spaced from said  
18 end of said fiber optic element by said  
19 tube, and  
20 signal processing means including common mode  
21 signal rejection processing.